Clinical and Experimental Health Sciences

Are Youtube™ Videos Useful for Biostatistics Education: A Sample of Logistic Regression

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ABSTRACT

Objectives: To examine the quality and educational content of YouTube videos related to logistic regression.

Methods: A comprehensive electronic search was performed for 'Logistic Regression" on YouTube.The first 70 videos were evaluated for each term. Videos were evaluated using Global Quality Score [GQS] checklists and were classified as useful and insufficient by two statisticians.

Results: Of the 70 videos analyzed, 53 were included. The mean GQS value was 3.9+1.1. Fourty videos (75.5%) were classified as useful. Independent users tend to upload videos mostly Lecturer / Ph.D., Lecturer Msc. and Data science course channels. A significant difference was observed in GQS among useful and insufficient videos. The mean GQS scores of useful videos were 4.3 (s.d.:0.8), for insufficient videos were 2.5 (s.d.:0.5).

Conclusion: Specialists or instructors could refer their students to YouTube resources and actively participate in the development of video-sharing platforms for biostatistics.

Keywords: Biostatistics, logistic regression, YouTube, remote learning

1. INTRODUCTION

Logistic regression is a statistical method, which has wide acceptance in various areas, such as biostatistics, machine learning, especially in biostatistics. The roots of Logistic regression come from the early 19th century (1).

Logistic regression is used in biological and medical research in order to determine the effect of independent variables (or just one variable) on a dependent variable. It is a regression model, which uses the logistic function to build a model for the dichotomous dependent variable. There is an important difference between linear regression and logistic regression, which is the characteristic of the dependent variable.

The logistic regression model can be also thought of as a multivariate model when more than one independent factor or covariates were used. Its results don't show only the effect of independent variables individually but also the interaction effect on the dependent variable. Logistic regression has limited assumptions when compared with linear regression, which is the reason of common use of it.

YouTube™ is the most popular video-sharing platform worldwide. YouTube™ is providing informative videos on different topics, as well as videos with entertaining content. Since YouTube™ is not a peer-reviewed platform, in each and every topic there are some useful videos such as misleading videos, which give missing or biased information. There is a number of studies evaluating the quality of information at YouTube™ videos on various topics. It is clear that the quality of content producers increasing day by day (2)).

Remote teaching becomes an important role for education, especially during pandemia. Basilaia and Kvavadze (2020) express that information technologies and communication are used to assist in the acquisition and development of knowledge from particular remote locations. It uses the internet, video/audio and text communication and software to create the learning environment (3)).

Considering the significance of using visual objects and video for teaching, some universities use YouTube as a complementary teaching instrument (4)). Students, researchers and academicians use video resources to learn statistics.

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The aim of this study is to evaluate usefullness of the Logistic Regression videos published in YouTube. One step further purpose is to evaluate the use of Youtube as a source of information for advanced statistical methods, by using the Logistic regression examples. To the best of current knowledge of authors, this study is the first to assess the content of YouTube videos on a specific statistical topic.

2. METHODS

The study was designed to evaluate YouTube videos related to Logistic Regression. Videos were scanned by searching on the YouTube search web site (www.youtube.com) by using the selection filters of Google. The search was performed in English at 18.10.2021 by using the search terms were "Logistic regression" "youtube".

The selection criterias were:

- Only English pages
- Videos with the length of 4-20 minutes.
- Videos uploaded within the past one year.
- Only high-quality videos.

The search produced 70 videos. Seventeen of them were excluded (8 videos non-English, 7 videos were irrelevant, 1 high-speed video, 1 video was difficult to understand). Assessments were performed on 53 eligible videos (Figure 1).

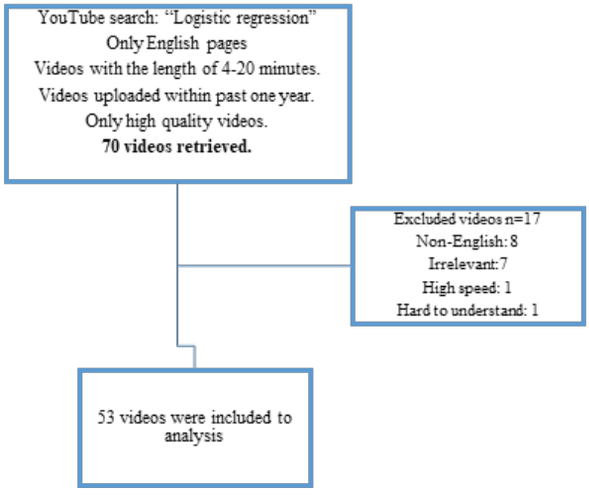

Figure 1. *Flowchart diagram of the selection process*

The web links, watching times, length of video (min), uploading date, video title, number of likes and dislikes, total number of viewes and the source of the videos were recorded in Microsoft Excel database. Days since upload were evaluated by taking the difference between upload date and the date when the search was performed (5)). The overall quality of the videos was examined following GQS criterias (Table 1) Global Quality Scale (GQS), Usefullnes evaluation were calculated by authors.

Table 1. *Global quality scale.*

Score	Global Scale Description
1	Poor quality, poor flow of the site, most information, not at all useful for patients.
2	Generally poor quality and poor flow, sone information listed but many important topics missing, of very limited use to patients.
3	Moderate quality, suboptimal flow, some important information is adequately discussed by others poorly discussed, somewhat useful for patients.
4	Good quality and generally good flow, most of the relevant information is listed, but some topics not covered, useful for patients.
5	Excellent quality and excellent flow, very usef for patients.

Video content was classified as useful and insufficient by the authors. Two statisticians are independently evaluated all the videos which were outside exclusion criteria for usefulness and grouped them into the following categories at the same time. The statisticians were blinded to each other's evaluations, in the event of a discrepancy a final decision was made by a third statistician. The group classifications were: Videos designated as useful information were accurate included scientific and comprehensive information about logistic regression. The videos contained incorrect information or did not contain information on how to contstruct logistic regression model are classified as insufficient videos.

In addition to all quality assessments the interaction index and viewing rate were calculated according to the following formulas (6)).

$$\text{Interaction Index} = \frac{(\text{likes} - \text{dislikes})}{\text{number of views}} x100$$

$$\text{Viewing Rate} = \frac{\text{total no of views}}{\text{number of days since upload}} x100$$

Videos were watched by two authors (ABE, NGİ) blindly, Global Quality Scale and the usefulness score were compared between two authors Any conflicts were corrected by discussion, full consensus has been provided. No ethical approval was needed for this study.

2.1. Statistical Analysis

The normality distribution of continuous variables were evaluated by Shapiro-Wilk's test. Mean, standard deviation, median, minimum and maximum are presented as descriptive statistics. Two normally distributed independent groups were compared by using Student t test. Non-parametric statistical methods were used for values with non-normally distribution. Two non-normally independent distributed groups were compared by using Mann Whitney U test. Statistical significance was accepted when two-sided p value was lower than 0.05. Statistical analysis was performed using the MedCalc Statistical Software version 12.7.7 (MedCalc Software bvba, Ostend, Belgium; http://www.medcalc.org; 2013).

3. RESULTS

The videos after searching 70 videos were scanned to evaluate by means of inclusion criteria. The exclusion reasons were: non-English videos (8), irrelevant videos (7), high-speed video (1), the video was difficult to understand (1). 53 videos were eligible and included in the analysis. The videos were classified by the means of source (Table 2). Most videos were uploaded by lecturers at least MSc. Level (58.5%). The length of the videos was 11 minutes, 37 seconds with a standard deviation of 4 minutes, 42 seconds. The mean of the total number of views was 1509.7+1905.8 (min:1, max:9389). The mean interaction index was 2.5+2.6, whereas the viewing rate was 860.8+1285.1 (Table 3).

Table 2. *Source of video.*

Source	n	%
Lecturer / PhD	20	37.7
Lecturer Msc.	11	20.8
Data science course channel	10	18.9
Lecturer	4	7.5
Data engineer	2	3.8
Data scientist	2	3.8
Software engineer	2	3.8
Product developer	1	1.9
Student	1	1.9
Total	53	100

Table 3. *Video characteristics.*

	Mean+SD	Med(min-max)
Length of video (min)	11:37+4:42	11:40(2:02-19:54)
Total views	1509.7+1905.8	808(1-9389)
No of likes	27+25.4	21(0-96)
No of dislikes	0.5+1.3	0(0-5)
Interaction index (%)	2.5+2.6	2(0-15.8)
Viewing rate (%)	860.8+1285.1	397.5(6.7-7250)
Global Quality Scale	3.9+1.1	4(2-5)
	n	%
GQS-1	0	0
GQS-2	7	13.2
GQS-3	13	24.5
GQS-4	14	26.4
GQS-5	19	35.8

Also, videos were classified by the authors as useful and insufficient. Forty (75.5%) of videos were classified as useful whereas thirteen (24.5) of them were assessed as insufficient.

The Global Quality Score assessed eligible videos 7 (13.2%) videos as generally poor, 13 (24.5%) moderate quality, 14 (26.4%) good quality, 19 (35.8) excellent quality.

Interaction index, viewing rate, and the number of dislikes do not differ between useful and insufficient videos (p=0.828, p=0.069). The median global quality scale was 4 in useful videos and 3 in insufficient videos, the difference between them was statistically significant (p<0.001) (Table 4). Also number of likes and number of total views are statistically significantly higher at useful videos (p=0.003, p=0.010).

Videos were classified by sources as lecturers (Msc or PhD) and others (student, data scientists, data engineer, software engineer, lecturer, product developer). Both groups do not have statistically significant difference by means of number of likes, number of dislikes, total views, interaction index and viewing rates. Videos uploaded from lecturers has been scored at higher Global Quality Scale levels relatively (p<0.001) (Table 5).

Table 4. *Comparison between useful, insufficient Youtube videos.*

	Useful (n=40)	Insufficient (n=13)	p
Likes			**0.003**
Mean+SD	31.4+24.8	13.5+23.2	
Med(min-max)	26.5(0-96)	3(0-80)	
Dislikes			0.716
Mean+SD	0.6+1.3	0.4+1	
Med(min-max)	0(0-5)	0(0-3)	
Total views			**0.010**
Mean+SD	1781.1+2076.3	674.6+852.8	
Med(min-max)	935.5(1-9389)	328(3-2361)	
Interaction index (%)			0.828
Mean+SD	2.3+1.7	3.3+4.4	
Med(min-max)	2.2(0-10.7)	1.8(0-15.8)	
Viewing rate (%)			0.069
Mean+SD	895.8+1288.0	753.2+1320.8	
Med(min-max)	465.8(6.7-7250)	268.5(20-4685.7)	
Global Quality Scale			
Mean+SD	4.3+0.8	2.5+0.5	**<0.001**
Med(min-max)	4(2-5)	3(2-3)	

Table 5. *Comparison between source types Youtube videos.*

	Lecturer PhD+Msc (n=31)	Other (n=22)	p
Likes			0.108
Mean+SD	28.4+20	25+31.9	
Med(min-max)	26(2-76)	9(0-96)	
Dislikes			0.383
Mean+SD	0.3+0.7	0.9+1.7	
Med(min-max)	0(0-3)	0(0-5)	
Total views			0.100
Mean+SD	1496.4+1521.6	1528.4+2384.4	
Med(min-max)	879(19-7128)	420.5(1-9389)	
Interaction index (%)			0.396
Mean+SD	2.8+3	2.2+2	
Med(min-max)	2.2(0.3-15.8)	1.9(0-8.7)	
Viewing rate (%)			0.386
Mean+SD	627.9+501.3	1188.9+1880.8	
Med(min-max)	463.7(111.8-2277.3)	334(6.7-7250)	
Global Quality Scale			**<0.001**
Mean+SD	4.4+0.8	3.1+0.9	
Med(min-max)	5(2-5)	3(2-5)	

Other: Student, data scientist, lecturer

4. DISCUSSION

YouTube is a popular video-sharing platform, which is open-access. People mostly use YouTube to access information on any topic. Many people use Youtube videos to get informed about statistical methods. Day by day online content on any topic becomes more popular. YouTube was always thought of as an important source for video content, because of its characteristic of being open access. This situation highlighted the importance of the quality of videos.

The purpose of this study was to evaluate the quality and usefulness of YouTube videos concerning logistic regression. By the way, it was also aimed that, when taking "logistic regression" on the focus, generalize this study by questioning " Are the YouTube videos about advanced statistical methods useful?"

Previous studies mostly evaluated health-related topics (7-15) such as keratoconus, lung cancer, acute myocardial infection, COVID 19 or dentistry. To the best of our knowledge the present study is the first to analyze the content of Youtube videos on a topic of biostatistics.

Logistic regression is a statistical method which includes many basis statistical information in it. On this vision, videos which are thought to be useful should contain all the base information about logistic regression.

In the present study videos were evaluated according to their source. Likes, dislikes, total views, interaction index and viewing rate do not differ between lecturer (MSc. And PhD) sourced videos and videos from other (*Student, data scientist, lecturer)* sources, whereas global quality scale was higher at videos from lecturers than the others. Similarly, Sallı et al.(14) found that, the videos uploaded from independent users have lower quality than videos uploaded from health professionals.

GQS was also higher in useful videos, when comparing insufficient videos, which shows the paralellism between GQS and authors' evaluation. Gaş et al(15)) reported that 59.7% of videos which are uploaded by health professionals were moderate or excellent in usefulness score. This result was similar to the present study.

Correlatively to our study, many of the studies stated that YouTube videos can be used for educational purposes(14, 15) however Fialho et al. (10) stated that there are some misleading videos and contents should be checked by experts.

The present study has some limitations. YouTube is a highly dynamic platform, so gathered information can vary in a very short time. Every day millions of videos are uploading and topic and the content is always changing. Performing these methods of this study can be cause different results, because of the dynamic structure of the platform.

5. CONCLUSION

Most of the videos were classified as useful. Although the quality is varying through videos, people can use YouTube to get information for advanced biostatistics topics by being selective for videos.

Conflict of interests

The authors did not declare any conflict of interest.

REFERENCES

[1] Cramer JS. The origins of logistic regression. SSRN Electronic Journal 2003;2002-119/4.

[2] Lee KN, Son GH, Park SH, Kim Y, Park ST. YouTube as a source of information and education on hysterectomy. Journal of Korean Medical Science.2020;35(25):e196.

[3] Basilaia G, Kvavadze D. Transition to online education in schools during a SARS-CoV-2 Coronavirus (COVID-19) pandemic in Georgia. Pedagogical Research 2020;5:1-9.

[4] Moghavvemi S, Sulaiman A, Jaafar NI, Kasem NJTIJoME. Social media as a complementary learning tool for teaching and learning: The case of youtube. The International Journal of Management Education. 2018;16:37-42.

[5] Li M, Yan S, Yang D, Li B, Cui W. YouTube™ as a source of information on food poisoning. BMC Public Health 2019;19(1):952.

[6] Kovalski LNS, Cardoso FB, D'Avila OP, Corrêa APB, Martins MAT, Martins MD, Carrard VC. Is the YouTube™ an useful source of information on oral leukoplakia? 2019;25(8):1897-905.

[7] De La Torre AB, Joe S, Lee VS. An evaluation of YouTube videos as a surgical instructional tool for endoscopic endonasal approaches in otolaryngology. Ear, Nose, & Throat Journal 2021:145.561.3211062447.

[8] Seyyar SA, Tıskaoğlu NS. YouTube as a source of information on keratoconus: A social media analysis. Clinical & Experimental Optometry 2021:1-5.

[9] Li JZH, Giuliani M, Ingledew PA. Characteristics assessment of online YouTube Videos on radiotherapy for lung cancer. Cureus 2021;13(10):e19150.

[10] Fialho I, Beringuilho M, Madeira D, Ferreira JB, Faria D, Ferreira H, Roque D, Santos MB, Gil V, Augusto JB. Acute myocardial infarction on YouTube – is it all fake news? Revista Portuguesa de Cardiologia 2021;40(11):815-825.

[11] Martin A, Thatiparthi A, Liu J, Wu JJ. Atopic dermatitis topical therapies: Study of YouTube videos as a source of patient information. Cutis. 2021;108(3):139-141.

[12] Arslan B, Sugur T, Ciloglu O, Arslan A, Acik V. A cross-sectional study analyzing the quality of YouTube videos as a source of information for COVID-19 intubation. Brazilian Journal of Anesthesiology (Elsevier) 2022 Mar-Apr;72(2):302-305.

[13] Yagiz O, Yavuz GY, Keskinruzgar A, Acibadem E. Analyses of Youtube videos on botox treatment of gummy smile. The Journal of Craniofacial Surgery 2022 Jun 1;33(4): e433-e438.

[14] Altan Şallı G, Egil E. Are YouTube videos useful as a source of information for oral care of leukemia patients? Quintessence International (Berlin, Germany : 1985). 2020;51(1):78-85.

[15] Gaş S, Zincir Ö, Bozkurt AP. Are YouTube videos useful for patients interested in botulinum toxin for bruxism? Journal of Oral and Maxillofacial Surgery. Official Journal of the American Association of Oral and Maxillofacial Surgeons 2019;77(9):1776-1783.

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